

## Claims

1. A virtual protection method for a fiber path, comprising:
  - a. physically dividing the optical port into multiple minimum protection units;
  - b. dividing the minimum protection units of more than one protection channel in each optical port into different logic-systems to form more than one logic-system;
  - c. each node in each logic-system working in one of the four working modes: normal working mode, passing working mode, bridging working mode and switching working mode; and
  - d. when the protection is needed, switching normal working mode of each node to the other three working modes.
2. The method according to claim 1, wherein the switching is a multiplex section protection switching, or a sub-network connection protection switching, or a channel protection switching.
3. The method according to claim 2, wherein the multiplex section protection switching comprises the steps of:
  - d1. creating logic-systems for protection switching;
  - d2. obtaining four sets of pages: working pages, switching pages, bridging pages and passing pages by analyzing current configuration; and
  - d3. after determining whether a node is a passing node, a bridging node or a switching node, sending down a passing page to the passing node, sending down a bridging page to the bridging node and sending down a switching page to the switching node.
4. The method according to claim 3, step d3 further comprising:

if the current node sends down a passing page, directly passing through input protection bus of the node to output protection bus of the node; if the node sends down a bridging page, replacing output working bus of the node with input protection bus of the node; if the node sends down a switching page, replacing output protection bus of the node with input working bus of the node.
5. The method according to claim 1, wherein the minimum protection unit is a VC4 or a VC3; the step b is mapping one or more than one of multiple VC4s or VC3s into different logic-systems to form more than one logic-system.

6. The method according to claim 1, wherein when implementing protection switching in a certain logic-system, only services of a logic-system satisfying the current logic-system protection switching trigger condition participate in the protection switching.

7. The method according to claim 1, further comprising:

adjusting and crossing services which are sent to the same minimum protection unit from different minimum protection units to the same minimum protection unit by a time-division cross-connect unit in the transmission system.

8. A virtual protection device for a fiber path, at least comprising:

a paging analyzer for analyzing configuration of a logic-system, creating corresponding working pages and storing the working pages in the switching controller said below;

a switching controller for sending down corresponding working pages to the cross-connection panel said below according to switching state; and

a cross-connection panel for performing bus connection appropriately according to the sent down working page.

9. The device according to claim 8, wherein the working pages are normal working pages, or passing pages, or bridging pages, or switching pages.

10. The device according to claim 8, wherein the bus connection is the connection of input and output working buses of the current node, or that of input and output protection buses of the current node, or that of input protection bus and output working bus of the current node, or that of input working bus and output protection bus of the current node.

11. The device according to claim 9, wherein the bus connection is the connection of input and output working buses of the current node, or that of input and output protection buses of the current node, or that of input protection bus and output working bus of the current node, or that of input working bus and output protection bus of the current node.